

DATE August 27, 2021

REQUEST FOR PROPOSAL NO. PS20210991  
CONSULTING SERVICES FOR THORNTON PARK PUMP STATION UPGRADES

ADDENDUM NO.3

RE: REVISED SCHEDULE A

1. REVISED SCHEDULE A (Please use this as the most current version)

*See attached for details.*

This addendum must be completed, and attached to your Application form.

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NAME OF VENDOR

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SIGNATURE OF AUTHORIZED SIGNATORY

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DATE

Jason Lo  
Contracting Specialist

## 1. INTRODUCTION AND SUMMARY OF REQUIREMENT

The City of Vancouver's (the City) Thornton Park Pump Station is in need of a major upgrade. The purpose of this Request for Proposal (RFP) document is to outline the requirements in retaining a multidisciplinary consulting team for design and construction services for the upgrade works.

## 2. BACKGROUND

Thornton Park Pump Station is located at the northwest corner of Terminal Avenue and Station Street. It services an 86 hectare catchment area, including portions of False Creek Flats, Chinatown, and Northeast False Creek. The pump station was originally constructed in 1993. Due to severe corrosion, the pump discharge bases were replaced and the wetwell discharge piping recoated in 2008. Further corrosion of the wetwell discharge piping resulted in failure and replacement in 2021.

The station consists of a typical wetwell/drypit configuration with four submersible pump bays (three occupied) and an adjacent below-grade valve chamber constructed of cast-in-place concrete. A dividing wall and sluice gates split the wetwell into two cells to facilitate wetwell maintenance. Electrical and control equipment is housed in an above-grade concrete building. The station also contains a separate room for odour control equipment.

In 2019 AECOM completed a station assessment and upgrade strategy report for the facility, which is appended to this RFP. The assessment outlines the facility's current condition, future inflow projections under various I&I scenarios, and recommended facility upgrades. The schedule for this project is being driven by construction of the new St. Paul's Hospital, which is scheduled for occupancy in 2027. Major station upgrades are required to accommodate the new hospital development. In addition to AECOM's assessment, Water Street Engineering completed a wetwell condition assessment as part of the wetwell piping repairs completed in 2021. Their report is appended to this RFP.

### 2.1. PROJECT AREA



**Figure 1:** Project Location (captured from VanMap)



## Scope of Work

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Terry Zhang

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### 3. WORK SCOPE

The Consultant shall provide all services necessary to design the facility upgrades, prepare the construction contract documents, ensure the upgrades are constructed in accordance with design and administer the construction contract. Works shall include other upgrades as necessary or determined during design, even if not explicitly identified in this scope of work. This shall include, at a minimum, the following services and such additional services as are indicated in the Consultant's Proposal.

#### 3.1. GENERAL PROJECT REQUIREMENTS

Unless otherwise noted, payment for work under General Project Requirements will be incidental to work under other requirements.

##### 3.1.1. Project Coordination

During the course of the Project, the Consultant shall act as the Project Coordinator and Contract Administrator on the Project. Reporting will be through City-provided templates and shall follow the City's Project Management Framework. Any other Consultant-proposed templates will require approval from the City prior to use. The Consultant shall provide project coordination, including all phone calls, emails, queries, meetings, etc. that may be required to advance the project and consult and seek clarification on scope items with the relevant City contacts.

The Consultant shall organize and chair project meetings, prepare agendas, and take minutes. Meetings will be held at the City's offices (11<sup>th</sup> floor - 450 SW Marine Drive, Vancouver), virtually, or on-site as appropriate. Project meetings shall be as frequent as required by Project circumstances, but the Consultant shall allow for, at a minimum:

- kick-off meeting;
- risk workshop meeting;
- review meetings for all submissions;
- meetings at major milestones;
- tender site meeting;
- weekly construction meetings (may change to biweekly towards the end of construction);
- pre-commissioning meeting; and
- lessons learned review meeting.

During the course of the Project, the Consultant is required to consolidate, track and resolve comments through the design and construction process. This includes comments from the City and key external partners/stakeholders such as adjacent land and asset owners. The Consultant shall track and keep a log of all comments made, including the originator of the comment, date, status of the comment, resolutions, and any action items.

The Consultant shall inspect and become familiar with site conditions and constraints and identify any approvals, permits (utility, archaeological, etc.), land and/or right-of-way requirements for design and construction of the Project.



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#### 3.1.2. Submission Reviews

For all major submissions, the City shall be provided with a draft submission for review prior to finalization. The Final submission shall incorporate or address all City comments made on the draft submission. Allow 3 weeks minimum for City review. Where, in the opinion of the City, the submission does not satisfy the submission requirements due to inadequate detail, insufficient explanation of design choices, excessive spelling/grammar errors, or other similar deficiencies of the work, the City will reject the Consultant's submission. The Consultant will be required to address the deficiencies prior to review by the City, at no additional cost.

For comments on design package submissions (25%, 50%, 75%, 90%, 95%, and 100%), City comments can be incorporated into the next design package submission. All finalized documents shall be signed and sealed by the engineer of record.

Design submission expectations are outlined in the latest version of the Wastewater Pump Station Guidelines. The following sections lay out the general expectations for design submission requirements and should be looked at in conjunction with the requirements of the latest version of the Wastewater Pump Station Guidelines.

#### 3.2. CONCEPTUAL DESIGN

##### 3.2.1. Project Kick-Off

- a) The City will provide the Consultant with any available background information (reports, record drawings, operating data, etc.) for the project. The Consultant shall review the provided information as well as collect additional relevant information where available.
- b) The Consultant shall prepare a base plan showing the existing infrastructure within the project boundary. This shall include BC One Call coordination and a ground-surface topographic survey. The City will provide the Consultant with an AutoCAD file showing relevant information extracted from the City's GIS database.
- c) The Consultant shall provide **provisional** pricing for a sub-surface GPR survey to compliment the topographic survey.
- d) Where the location or elevation of an existing underground utility is critical for design, the Consultant shall conduct test hole exploratory works to confirm the actual location and elevation of the utility. The Consultant is responsible for retaining a contractor to conduct the work, coordinating their work, and any miscellaneous associated works. This work shall be priced as a **provisional** item assuming three test holes will be required.
- e) Consultant pricing for these items shall include all associated works (traffic control, permit coordination, etc.).

##### 3.2.2. Archeological Considerations

The pump station is not known to be located near any known archeological sites. However, any ground-disturbing activities must be performed in accordance with the City's Chance Find Procedure. All person's participating in ground-disturbing



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activities must familiarize themselves with the City's Chance Find Procedures, including any inspectors.

Where a representative of the First Nations and/or the City's Archaeologist requests to be on-site during ground-disturbing activities, the Consultant shall accommodate their request.

#### **3.2.3. Environmental Site Assessment**

The lands surrounding Thornton Park Pump Station was historically a section of False Creek that was backfilled with unknown quality of materials. As part of their work, the Consultant shall conduct a Level II Environmental Site Assessment (ESA) to determine soil and groundwater contaminants.

#### **3.2.4. Soil Corrosivity Testing**

In coordination with soil sampling program for the Level II ESA, the Consultant shall determine the soil corrosivity in accordance with AWWA C105.

#### **3.2.5. Seismic Evaluation**

AECOM's station assessment included a preliminary seismic resiliency assessment. However, their assessment was inconclusive and recommended a more detailed seismic assessment be completed following geotechnical testing to confirm seismic soil parameters.

Following a review of AECOM's assessment, the Consultant shall perform a detailed assessment of the facility's expected seismic performance. This shall include a desktop geotechnical review using borehole information presented on the station's record drawings. As part of this work, the Consultant shall evaluate whether additional geotechnical testing is required to conduct the seismic evaluation.

The Consultant shall use a performance-based approach to evaluate the facility's expected seismic performance. This shall include an assessment of the facility's structural components as well as non-structural components and critical systems. The Consultant shall specifically comment on the likely condition of the facility following a major earthquake (BCBC 2018 design event: 1/2475 years), expected levels of damage to the facility's critical systems (super-structure, sub-structure, pumps & piping, electrical, etc.), and whether the facility will be immediately operable (possibly with minor repairs). In addition, the Consultant shall comment on expected performance during minor earthquakes (1/475 years).

Based on the evaluation, the Consultant shall prepare a list of recommended facility upgrades to address the findings of the seismic evaluation. The target performance goal for this facility is equivalent to "Operational A-1" performance level as defined by ASCE 41: following an earthquake the facility's structural elements shall allow for immediate occupancy and the non-structural components and systems shall be immediately operable (possibly with minor repairs).



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#### 3.2.6. Geotechnical Assessment [Provisional]

The Consultant shall provide provisional pricing for a sub-surface geotechnical investigation and assessment. The Consultant shall confirm the site-specific soil conditions and seismic design criteria. In addition, this work shall include an assessment of the potential for liquefaction and other ground movements (lateral spread, settlement, etc.). The findings of the assessment shall be summarized in a geotechnical report. The report shall also include recommendations for construction methodology and allowable soil bearing pressure for any new infrastructure (building additions, genset pad, chambers, etc.).

#### 3.2.7. Discharge Header Assessment

The station's discharge header is original to the station, and has been in service since 1993. As part of the work, the Consultant shall evaluate the condition of the header to determine the remaining service life and potential operating risks.

- a) Perform a visual inspection of the header pipe and identify any deficiencies or concerns, and comment on the condition of the coating.
- b) Evaluate the extent of internal corrosion, if any, and the remaining wall thickness/service life using ultrasonic non-destructive testing (or other methodology as approved by the City Engineer). Provide a diagram of header pipe showing variations in wall thickness and highlighting any areas of concern.
- c) Evaluate drain and air release nipples for corrosion/degradation using non-destructive testing methodology.
- d) All personnel conducting non-destructive testing shall be appropriately certified.

#### 3.2.8. Station Flood Risk Assessment

The Consultant shall identify potential flood risks and mechanisms at Thornton Park Pump Station and evaluate potential damage and mitigation options. At a minimum, the assessment shall:

- a) Consider the following flood scenarios in evaluating flood risk to the facility:
  - i. Failure of the pumping system resulting in flooding of the wetwell to the overflow relief elevation;
  - ii. Failure of the pumping system and overflow relief system resulting in surcharging of the sewer and wetwell to ground elevation;
  - iii. Coastal flooding to the City's Flood Construction Level (FCL); and
  - iv. Any other potential flooding scenarios identified by the Consultant.
- b) Develop a figure showing expected water levels for each flooding scenario superimposed on a section view of the station. The figure should show the major areas of the facility and all openings/penetrations into the dry areas of the station from either the station exterior or wetwell. For each opening/penetration, include a general description, location, size, and elevation.
- c) For all openings/penetrations identified below the floodwater levels considered, evaluate whether it could flood some portion of the facility. If flooding could result, identify whether it would cause a station failure, potential extent of damage to the





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station, and potential upgrade options to prevent flooding (i.e. backwater valves, rerouting penetrations, flood doors, etc.).

- d) Recommend facility upgrades to mitigate potential flood risks at the facility. Recommendations should consider the cost of upgrades in comparison to the potential flood damage being mitigated. Facility upgrade recommendations should be incorporated into the overall station upgrade strategy.

#### 3.2.9. Pump Selection Criteria

##### 3.2.9.1. Design Capacity

A Station Inflow Assessment was completed by AECOM to determine the current station inflows. It was found that the current PDWF is 67 L/s and the current PWWF is 244 L/s. This indicates that the catchment behaves as a combined sewer system, with significantly increased flows during wet weather. This is in agreement with the City's understanding of the catchment.

AECOM also prepared a Baseline Capacity Analysis to project future (2041) inflows to the station based on developments and future population projections. Four flow scenarios were presented based on varying levels of sewer separation and I&I reduction work. The 2041 PWWF to the station was estimated to range from 301 L/s to 609 L/s.

As part of this project, the Consultant shall review AECOM's assessments regarding future station inflows. Based on the assessments and discussions with the City, the Consultant shall recommend a station design capacity for use in pump selection.

##### 3.2.9.2. Discharge HGL

The forcemain for Thornton Park Pump Station connects to the forcemain for the City's Terminal Central Pump Station. This combined forcemain then discharges to Metro Vancouver's Columbia forcemain which services their Columbia Pump Station. The Columbia forcemain transports flow from all three stations to the termination point at 8<sup>th</sup> Avenue and Yukon Street where it discharges to the 8<sup>th</sup> Avenue Interceptor. As a result, the discharge conditions for all three stations can vary significantly.

The complexity of this forcemain network is expected to increase in the future. The City is planning to construct a redundant forcemain connecting the City's Nelson Pump Station forcemain to the Columbia forcemain. The goal of this redundant forcemain is to add resiliency to both systems. The resulting network will be hydraulically complex in nature containing four pump stations, 15 individual pumps, numerous air valves, and 6.4 km of forcemain piping ranging from 500 mm to 900 mm in diameter.

The design of the redundant forcemain was completed by WSP. As part of their work, WSP assessed the combined hydraulic system under various operating scenarios including transient modelling. As part of this project, the Consultant shall review WSP's final report (300 pages). WSP's hydraulic model (Bently WaterCAD) will be made available to the successful proponent. Based on WSP's report and model, the Consultant shall make recommendations for pump selection criteria and operating parameters.

**3.2.10. Hydraulic Transient Assessment**

The Consultant shall conduct a preliminary hydraulic transient analysis to determine if a more detailed analysis is required. The preliminary analysis shall include a review of WSP's work (described in 3.2.9.2) and may use a similar methodology to that used in AWWA M11 if appropriate. A detailed transient analysis is not included in this scope of work.

There is an existing combination air/vacuum surge-relief valve (Vent-o-mat RGX) connected to the discharge header. The Consultant shall review the installation and make recommendations for upgrades or upsizing if warranted.

**3.2.11. Conceptual (25%) Design**

At a minimum, the Consultant shall develop three conceptual design options for assessment and review.

**3.2.11.1. Conceptual Design Options**

At a minimum, the Consultant shall develop three conceptual design options for the City's assessment and review including 25% drawings and Class C cost estimate for each option.

- a) **Design Option A: Building Reuse** – For this option, the Consultant shall incorporate all facility upgrades within the existing building footprint without any building additions or separated enclosures (aside from an exterior pad-mounted genset). The Consultant shall identify where the design does not conform to the City's requirements due to space constraints, such as using soft starters instead of VFDs.
- b) **Design Option B: Building Expansion** – For this option, the Consultant can incorporate a building addition and/or exterior enclosure such that the design is fully in compliance with the City's requirements.
- c) **Design Option C: Building Replacement** – For this option, the Consultant shall evaluate the feasibility of demolishing and reconstructing the above-grade structure while reusing the below-grade wetwell and valve pit.
  - The new building shall fully enclose the wetwell access hatches such that Operators can maintain pumps without disturbing the public.
  - The Consultant shall evaluate installation of the genset both inside and outside of the new building.
  - A two-storey building may be considered pending structural, operational, and cost considerations. Proceeding with a two-storey building may be influenced by stakeholder feedback.
  - The design shall be in full compliance with the City's requirements.
- d) Additional design options identified by the Consultant.





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#### 3.2.11.2. Conceptual (25%) Design Drawings

At a minimum, these drawings shall include:

- Site plan showing the footprint of any buildings and building additions, generator, chambers, BC Hydro service, and forcemain/sewer modifications.
- Temporary bypass arrangement and phasing (where applicable).
- Floor plans and sections showing layout and arrangement of new equipment and modifications to existing systems/structures.
- Electrical single line diagram.

#### 3.2.11.3. Conceptual Design Report

The Conceptual design report shall include all items described in Section 3.2 unless otherwise agreed by the City.

### 3.3. DETAILED DESIGN

The Consultant will be responsible for the following:

#### 3.3.1. Detailed Design (50%, 75%, 90%, 95%, and 100%) Submissions

Prepare, for the City's review and approval, design and construction documents consisting of drawings and specifications setting forth, in detail, the requirements for the construction of the Project. The Consultant shall make, at a minimum, submissions in the 50%, 75%, 90%, 95%, 100%, IFT, and IFC design completion stages. Note, the submission requirements provided below should be read in conjunction with the City's Wastewater Pump Station Guidelines. Where there is a conflict, the earliest submission requirement shall apply unless otherwise agreed.

The Consultant shall submit revised cost estimates at each design stage (Class A, B, C, and D as appropriate at each stage);

##### 3.3.1.1. 50% Design Submission

- 50% design drawings should detail the general configuration of all station upgrades, proposed construction methodology, and bypass arrangement(s).
- 50% specifications should at a minimum include a preliminary summary of work, a list of relevant specifications, and preliminary list of supplementary specifications.
- 50% design report including summary of design parameters used in the design (including justifications), description of major station systems/features, identification and justification of any deviations from the City's Wastewater Pump Station Guidelines, and references to the 25% Conceptual Design report.
- The site plan shall indicate dimensions and location of building/additions, utility information, site piping modifications, incoming Hydro, bypass/valve chambers, and emergency genset (where applicable)



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- Process and Instrumentation Diagram (P&ID) drawing showing all process and instrumentation equipment used in the station and proposed identifications (tag names)
- Preliminary layout of building and any additions
- Pump selection, installation details, and operating levels shall be proposed.
- Flowmeter installation and any piping modifications shall be proposed.
- An electrical single line diagram including equipment identification, the layout of the MCC and control system panels, and any labelling/naming conventions shall be proposed.
- Excavation shoring options shall be identified (where applicable).
- Bypass pumping configuration and construction sequence shall be proposed.
- Station Process Control Narrative - Draft

#### 3.3.1.2. 75% Design Submission

- 75% design drawings, specifications, and report should incorporate any comments from the 50% design review.
- The building layout should generally be finalized.
- Exterior features, aesthetics, and integration with the Park should be proposed including architectural building elevations and landscape drawings.

#### 3.3.1.3. 90% Design Submission

- 90% design drawings, specifications, and report should incorporate any comments from the 75% design review (or 50% for Design Options A and B) and be largely complete only missing a few minor details required to construct the final works.
- The electrical distribution and control systems for this project shall be largely complete such that the design may be reviewed by the City of Vancouver Electrical Engineer for approval.
- Arc Flash assessment in accordance with CSA Z462 – Draft
- Station Bypass Options and Construction Sequencing Memo - Draft
- ITT Documents (schedule of quantities & prices, payment descriptions, special provisions, etc.) - Draft

#### 3.3.1.4. 95% Design Submission

- 95% design drawings and specifications should incorporate any comments from the 90% design review and should be tender ready.
- Station Process Control Narrative - updated
- Updated cost estimate and design memo not required for the 95% submission

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#### 3.3.1.5. 100% Design Submission

- 100% design drawings and specifications should tender ready with all City comments resolved and not lacking any details required to construct the final works.
- Design Memo – Final, signed and sealed
- ITT documents (drawings, specifications, schedule of quantities & prices, special provisions) excluding City provided front-end documents.
- Station Bypass Options and Construction Sequencing Memo – Final, signed and sealed
- Station Process Control Narrative – Final, signed and sealed

#### 3.3.1.6. Issued for Tender (IFT) Submission

- Final ITT documents (drawings, specifications, schedule of quantities & prices, special provisions) excluding City provided front-end documents, Class A cost estimate, and design report, signed and sealed by the EoR.

#### 3.3.1.7. Issued for Construction (IFC) Submission

- Final contract documents (drawings, specifications, schedule of quantities & prices, special provisions) incorporating any tender addenda, signed and sealed by the EoR.
- Revision and reissuance of contract documents throughout construction as required to facilitate changes to the construction contract (change orders, field instructions, etc.).
- Arc Flash assessment in accordance with CSA Z462 – Final signed and sealed (following shop drawing approvals)
- Station Process Control Narrative – Updated, signed and sealed (following station commissioning)

#### 3.3.1.8. Station Bypass Options and Construction Sequencing Memo

The Consultant, in consultation with the City, will determine the most effective manner to construct the Project. As part of this work, the Consultant shall complete an analysis of the bypass pumping requirements during construction and identify options for the configuration of the bypass system. Bypass options should minimize requirements for additional infrastructure while maximizing the reliability of the system. The construction methodology and bypass pumping requirements and options shall be presented in a memo format. The memo shall include a cost estimate for each bypass option presented and the Consultant's recommendations.

The City has prepared a list of requirements for temporary bypass systems, which the Consultant shall incorporate into the contract specifications and requirements. Any modifications or omissions changes to the City's Bypass Specification shall be approved by the City.



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#### 3.3.1.9. PLC Programming (Provisional)

The Consultant shall program the Programmable Logic Controllers (PLC) for the station. PLC programming functional requirements shall be confirmed with the City. Typical HMI screens and PCL I/O have been included in the City's Wastewater Pump Station Guidelines attached for reference.

No part of the PLC program shall be password protected or otherwise locked to prevent future changes or modifications. This work shall be priced as a **provisional** item.

#### 3.3.1.10. Design Codes, Guidelines, and Standards

- a) The Consultant shall review statuses, regulations, codes and by-laws applicable to the design and where necessary reviewing the same with the authorities having jurisdiction and obtain all required consents, easements, approvals, licenses, services, and permits necessary for the Project.
- b) In general, station upgrades shall follow the City's Wastewater Pump Station Guidelines available from the City's website (<https://vancouver.ca/files/cov/wastewater-pump-station-guidelines.pdf>). At the start of the project, the Consultant shall confirm the current edition of the Guideline with the City. In any instance where the Consultant's design deviates from the City's Guidelines, the Consultant shall identify the deviation with an explanation for why the deviation is required or recommended.
- c) The Consultant shall review and incorporate the City's general design guidelines and construction standards, as appropriate for this project. The current documents can be retrieved from the City's website: <https://vancouver.ca/streets-transportation/street-design-construction-resources.aspx>.
- d) The Consultant shall incorporate the City's pump station specific supplemental specifications into the overall specification package prepared by the Consultant. This shall include reviewing the specifications provided by the City, making recommendations for project specific modifications, updating the specifications where agreed to by the City, and incorporating the specifications into the Consultant's specification package.
- e) Items requiring detailed analysis, design, and specifications shall be as necessary to complete the refurbishment and upgrade of the pump station based upon the attached Thornton Pump Station Assessment Upgrade Strategy Report, the City of Vancouver's Wastewater Pump Station Guidelines, and the items identified in Section 3.3 of the RFP. Any associated works to complete the identified upgrades shall be considered incidental to the work. The Consultant can provide separate line items for this work if they choose.

### 3.4. PUMP STATION UPGRADES

#### 3.4.1. CPTED and Operator Safety

Substance use, (e.g. needles), theft, and vandalism are common occurrences in the surrounding neighbourhood. The Consultant shall incorporate Crime Prevention Through Environmental Design (CPTED) principles where relevant. In addition, the Consultant shall carefully consider the need for and configuration of any opening or



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crevices on the exterior of the station. Operations crews often find needles jammed into crevices around the facility. Special consideration shall be made to address these issues throughout all phases of design and construction.

#### 3.4.2. Architectural Improvements

The facility is located in a highly trafficked, prominent area of the City. The Consultant's design shall be aesthetically pleasing and seamlessly integrate with the surrounding neighbourhood. The Architectural scope of work shall include, at a minimum:

- i. Design Option A: Building Reuse
  - Minimal effort expected
  - Potential for new building cladding
  - Potential for screening around the genset
- ii. Design Option B: Building Expansion
  - Conceptual sketches/renderings to support stakeholder engagement
  - Visual integration of any building additions with existing building
  - Detailed architectural design for new building addition
  - Potential for new building cladding
  - Potential for screening around genset
- iii. Design Option C: Building Replacement
  - Minimum of 3 architectural concepts proposed
  - Architectural concept drawings or renderings for each concept to support stakeholder engagement
  - Detailed architectural design for the new building
  - The building may be required to incorporate First Nations and/or Public art.
  - Potential for screening around genset

#### 3.4.3. Landscaping

As the station is located adjacent to a park, some landscaping works will be required to integrate the facility with the surrounding area. Landscaping shall be carefully considered to avoid CPTED issues.

#### 3.4.4. Building Mechanical Improvements

##### 3.4.4.1. Heating, Ventilation, and Air Conditioning (HVAC)

- a) The existing ventilation system servicing the electrical room and valve drywell shall be replaced. The Consultant shall consider explosive

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atmosphere classifications and confined space entry requirements in the fan sizing and operation.

- b) The scrubber room ventilation system shall be replaced. The Consultant shall consider explosive atmosphere classifications and air quality in the fan sizing and operation.
- c) The wetwell ventilation system shall be replaced. The Consultant need only consider explosive atmosphere classifications requirements as additional temporary ventilation would be installed during confined space entry work.
- d) There are two existing electric unit heaters which are at the end of their useful life and shall be replaced. Heating requirements should be evaluated as part of the Consultant's design.
- e) The Consultant shall include a safe means of maintaining any roof-mounted equipment through guardrails or other modifications. Alternatively, the City would prefer that any equipment requiring maintenance be installed accessible from ground level within the building.
- f) Air conditioning at the station is not required.

#### 3.4.4.2. Odour Control System

The wetwell ventilation system shall include an odour control system. The City's preferred odour control system consists of a replaceable carbon filter and is outlined in the City's Wastewater Pump Station Guidelines.

#### 3.4.4.3. Potable Water Piping

- a) The existing potable water service piping and valves shall be relocated or separated from the electrical equipment to eliminate the risk of water spraying onto the MCC or other critical equipment. This can be accomplished through a partition, enclosure, or other means as proposed by the Consultant. The Consultant shall evaluate whether existing piping/valves can be reused or require replacement.
- b) Due to the depth of the wetwell, the existing wash-down hose system is ineffective for cleaning the wetwell. The Consultant shall review the existing installation, recommend system improvements, and incorporate changes into the design.

#### 3.4.4.4. Plumbing Fixtures

- a) The existing roof drain is connected to the sink drain pipe and drains to the wetwell. Divert roof runoff to infiltration trench or alternate green infrastructure with overflow to the storm sewer.
- b) For Design Option B and C, the Consultant shall incorporate the addition of a staff washroom, if feasible.

### 3.4.5. Structural and Seismic Improvements

#### 3.4.5.1. Structural Improvements





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- a) Building structural and seismic upgrades as identified in the detailed building structural assessment.
- b) Post-disaster concrete mounting pad for the genset.

#### **3.4.5.2. Seismic Improvements**

- a) The facility shall be upgraded to meet post-disaster performance rating where feasible. This includes any building additions.
- b) All equipment and systems shall be designed to meet post-disaster performance where feasible.

### **3.4.6. Process Mechanical Improvements**

#### **3.4.6.1. Sewage Pumping Units**

- a) Install a new pump Pump Bay #3, which is currently empty.
- b) Replace existing Pump #1 (Flygt CP 3230), Pump #2 (Flygt CP 3231), and Pump #4 (Flygt CP 3231) to suit the proposed pump design criteria.
- c) VFD starters shall be provided for each pump.

#### **3.4.6.2. Piping, Valves and Ancillary Equipment**

- a) Install new discharge piping and wall penetration for Pump #3. This shall include a new pump discharge base, guide rails, lifting chains, and other miscellaneous appurtenances as required.
- b) Replace all piping penetrations between wetwell and drywell with 316SS.
- c) Install second isolation valve downstream of check valve to facilitate double block during check valve maintenance.
- d) Replace all valves unless otherwise directed by the City.
- e) Replace forcemain drain-down piping and valves.
- f) Install pressure gauge on each pump discharge line.
- g) Install 50 mm drain between double block valves.
- h) Review installation and sizing of the existing combination air release/vacuum surge-buster valve, and modify/upscale as appropriate.
- i) Replace pump discharge piping in drywell up to header connection if warranted.
- j) The results of the discharge header evaluation may recommend replacement of the existing station discharge header. The proponent shall provide **provisional** pricing to cover the detailed design and construction services related to replacement of the discharge header.



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#### 3.4.7. Electrical System Improvements

##### 3.4.7.1. Electrical System

- a) Replacement of all electrical systems at the station. Provide calculation to support power requirements/sizing.
- b) The new MCC shall incorporate VFD starters for each pump, which shall be sized for the ultimate duty pump.
- c) The Consultant is responsible for any required coordination with BC Hydro. Review the sizing of the existing BC Hydro Pad-Mount Transformer (PMT). For the base scope of work, the Consultant shall assume the existing PMT is adequately sized, so that coordination work will be limited to the replacement of the service connection (between the station and the PMT) and meter. The Consultant shall provide **provisional** pricing for replacement or relocation of the PMT if it is found to be undersized. Required BC Hydro fees (permitting, application, design, etc.) will be paid directly by the City.
- d) Complete an arc flash hazard assessment in accordance with the latest edition of CSA Z462. Provide supporting calculations and a sealed memo outlining the findings.
- e) Assist the Contractor in their electrical permit application providing support as necessary (sealed drawings or other documentation).
- f) Review explosive atmosphere room classifications and equipment selection for compliance, and propose modifications to address any deficiencies.

##### 3.4.7.2. On-Site Standby Power

- a) Addition of an on-site back-up generator set and fuel tank. The generator set shall be seismically designed and mounted to a concrete pad (or slab depending on station configuration).
- b) Selection of the generator set enclosure shall consider the surrounding environment including sound attenuation, weatherproofing, vandalism, and SHARPs.
- c) Installation of an automatic transfer switch, generator load bank, and UPS as per Wastewater Pump Station Guidelines document



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#### 3.4.8. Control and Monitoring System Improvements

##### 3.4.8.1. Control System

- a) The existing PLC is no longer supported and shall be replaced with the City's current standard: duplex redundant PLCs in cold standby configuration. Refer to the City's Wastewater Pump Station Guidelines.
- b) Provide a written Pump Station Control Narrative outlining the operating logic, control set-points, alarm/warning/status notifications, equipment, and limitations of the Station's various systems.
  - i. All set-points shall include an explanation for why the suggested value was selected.
  - ii. The City will provide the Consultant with a Control Narrative example for reference. Any proposed deviations from the example shall be clearly identified with an explanation for the proposed change.
  - iii. The Consultant will be responsible for updating the Control Narrative with any modifications made during commissioning including a description of why the changes were required.
- c) Designs shall conform to the City's standard PLC I/O convention. Deviations shall be approved by the City prior to implementation.
- d) The proponent shall provide **provisional** pricing for the programming of the PLC.

##### 3.4.8.2. Instrumentation

- a) Add a flowmeter to the station's discharge header or forcemain
- b) Add a pressure transmitter to the station's discharge header
- c) Additional instrumentation as outlined in the City's Wastewater Pump Station Guidelines and as identified as the project progresses.

##### 3.4.8.3. Station Monitoring (SCADA)

- a) Refurbishment of the existing SCADA panel in accordance with the City's current standards. An itemized list of upgrade requirements will be provided by the City to incorporate into the contract requirements.
- b) Integration of the existing SCADA panel into the station's control system.
- c) Modifications to the station's radio antennae and cabling if required.
- d) Designs shall conform to the City's standard RTU I/O convention. Deviations shall be approved by the City prior to implementation

#### 3.4.9. Wetwell and Sewer Improvements

- a) Replace all four existing sluice gates within wetwell.
- b) Install two additional sluice gates on the dividing wall to facilitate 'double block' between wells.



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- c) Install valve-stem extensions and valve boxes for all sluice gates such that they can be operated from ground level, without wetwell entry.
- d) Remove existing access ladders, catwalks, scaffolding, and other miscellaneous items in the wetwell.
- e) Replace any corroded materials in the wetwell (pipe supports, conduits, cable straps, etc.) with corrosion resistant materials (stainless steel, plastic, FRP, etc.)
- f) The existing wetwell hatches lack modern safety features such as spring-assisted lift and safety grating. In addition, they are constructed of galvanized steel and are in various states of decay. The Consultant shall review the hatches and retrofit or replace the hatches as suitable. Pump hatches should be rated to support the full weight of the largest pump as the pumps are typically lowered onto adjacent hatches during maintenance work.
- g) Install mixer pump guide rails in each wetwell. Installation shall include access hatches and means of lifting (davit crane) the mixer pumps if inaccessible by the exterior monorail crane.
- h) Sewer modifications to facilitate full station bypass as part of this project and future works. This is envisaged to include a bypass MH and sewer isolation valves in 'double block and bleed configuration' to facilitate current and future station bypass systems. The City's preference is for an "offline" bypass MH with isolation valve such that the sump does not fill with sewage when not in use. Any modifications to the inlet sewers should be designed to accommodate expected differential settlement and seismic ground movement.
- i) Evaluate the feasibility, costs, and operational concerns of raising the wetwell dividing wall to the full height of the wetwell. The purpose of this change is to prevent the possibility of overflows from one wetwell to the other during wetwell entry work. The Consultant shall include this work in the conceptual design phase. The Consultant shall provide **provisional** pricing for detailed design and construction services related to implementation of the full-height wetwell dividing wall.
- j) The original station design includes an overflow pipe that can be installed in the wetwell to connect the two inlet manholes. However, implementation of the overflow pipe requires entry into the wetwell. As part of the conceptual design phase, the Consultant shall evaluate the feasibility and cost of installing a buried overflow pipe on the south side of the station to connect the two inlet manholes. The Consultant shall provide **provisional** pricing for detailed design and construction services related to implementation of the buried overflow pipe.

#### 3.4.10. Forcemain Improvements

- a) The Consultant shall incorporate a flexible connection to separate the forcemain and station to meet post-disaster requirements. Consider an EBAA Flex-Tend or equivalent solution.
- b) Incorporate a bypass port onto the forcemain. The bypass port shall be installed in a chamber but be accessible from ground level such that confined space entry is not required for use.
- c) A buried chamber may be the only feasible way of incorporating a flowmeter into the station. The Consultant shall include a flowmeter chamber as part of the



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conceptual design. The flowmeter shall be installed in a concrete chamber with adequate working space to facilitate maintenance and future replacement. The Consultant shall provide **provisional** pricing for detailed design and construction services related to the flowmeter chamber.

- d) The existing forcemain does not include an isolation valve to isolate it from the forcemain it shares with Terminal Central and Columbia Pump Stations. The Consultant shall assess both permanent (new valve) and temporary (line stop) solutions to facilitate construction and future maintenance.

#### 3.4.11. Green Infrastructure Improvements

- a) City of Vancouver's Green Infrastructure Branch has identified opportunities to implement green infrastructure practices and technology for this project. The Consultant shall determine the feasibility of implementing green infrastructure technologies including but not limited to:
  - i. Bioretention practices/technology to capture stormwater run-off and improve biodiversity
  - ii. Stormwater tree trench to treat and manage rainwater
  - iii. Other technologies as provided by City of Vancouver Green Infrastructure Branch subject to budget and feasibility of incorporating design
- b) Consultant shall provide **provisional** pricing for detailed design and construction services related to the green infrastructure technologies above

#### 3.5. FIRST NATIONS ENGAGEMENT

The City will engage with the Musqueam, Squamish, and Tsleil-Waututh First Nations for input on the project. The Consultant shall provide engagement materials (concept drawings, sketches, etc.), evaluate the feasibility and impacts of Nation's requests, and incorporate changes into the work as directed by the City.

#### 3.6. STAKEHOLDER ENGAGEMENT AND COORDINATION

The Consultant shall engage external stakeholders or assist the City with engagement as outlined below. Note the Stakeholders listed below are not exhaustive, and the Consultant is expected to engage with other Stakeholders as required throughout the project.

- a) **TransLink** - The Station is located within 25 m of Main Street-Science World SkyTrain Station. The City will engage with TransLink at each design stage to solicit comments and feedback. The Consultant shall provide engagement materials (concept drawings, sketches, etc.), evaluate the feasibility and impacts of TransLink's requests, and incorporate changes into the work as directed by the City.
- b) **Vancouver Board of Parks and Recreation** – While technically on City street right of way, the Station is located on the southeast corner of Thornton Park. The City will engage the Parks Board for feedback on the project. The Consultant shall provide engagement materials (concept drawings, sketches,



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etc.), evaluate the feasibility and impact of Parks Board requests, and incorporate changes into the work as directed by the City.

- c) **Providence Health Care (PHC)** - The project must be completed before the completion of the new St. Paul's Hospital. The Consultant shall coordinate with PHC (owner of St. Paul's Hospital) to determine the construction timelines of the new hospital and potential conflicts with works associated with the new St. Paul's Hospital
- d) **Via Rail** - The project is in proximity to Pacific Central Station owned by Via Rail. The Consultant shall provide engagement with Via Rail regarding construction and traffic impacts.
- e) **FortisBC** - There is a 300 mm FortisBC gas main that was relocated between the west inlet manhole and the west wetwell wall. The Consultant shall engage with FortisBC as required to advance the project. If the gas main needs to be relocated to facilitate the work, the City will directly coordinate relocation with FortisBC with the Consultant's assistance.
- f) **BC Hydro** - Based on AECOM's assessment, the existing BC Hydro service size is adequate to power the stations existing loads plus an additional pump. The Consultant shall confirm AECOM's assessment in their design and coordinate with BC Hydro as required for running a new feeder cable/service entrance to the station.
- g) **City of Vancouver Internal Branches (e.g. Water Branch, Green Infrastructure Branch)** – There is a 300 mm water main adjacent to the 300 mm gas main. The Consultant will assist the City in engaging the Water Department for feedback on the project. Green Infrastructure Branch has also identified opportunities in implementing green technology and practices to the project. The Consultant shall assist as required and incorporate changes to the work as directed by the City of Vancouver's internal departments and branches.
- h) **Park Users, Transit Users, Surrounding Businesses, and Residents** - Thornton Park Pump Station is located in a high-profile, densely-populated area of the City. Construction activities have the potential to create odour, noise, dust, and congestion issues. The City may choose to conduct public engagement activities. The Consultant shall provide engagement materials (concept drawings, sketches, etc.), evaluate the feasibility and impact of Public requests, and incorporate changes into the work as directed by the City. Assistance with public engagement shall be priced as **provisional** work.





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### 3.7. CONSTRUCTION TENDERING PROCESS

Tendering Process	Consultant's Responsibility	City-Provided
Bid Document Preparation	<ul style="list-style-type: none"><li>i. Prepare scope of work for construction including all signed and sealed tender drawings, technical specifications, special conditions, and technical concepts, and provides to the City for insertion into the bid document</li><li>ii. Reviews proposed Form of Agreement for conflicts with the design package.</li><li>iii. Reviews the final version of the bid document</li></ul>	<ul style="list-style-type: none"><li>a. Determines sourcing mechanism (ITT, RFP)</li><li>b. Assembles bid documents</li><li>c. Reviews and finalizes bid documents</li></ul>
Bid Document Posting/Advertising	<ul style="list-style-type: none"><li>i. Responds to technical questions received from tenderers</li><li>ii. Provides input to bid documents amendments</li><li>iii. Attends and documents site meetings required in the tendering process</li></ul>	<ul style="list-style-type: none"><li>a. Posts the bid documents/advertises</li><li>b. Posts bid document Q&amp;A</li><li>c. Disseminates technical/Project questions received from proponents to the Consultant</li><li>d. Posts bid document amendments, Q&amp;A, and/or extensions to closing dates</li><li>e. Organizes and attends site meetings required in the tendering process</li></ul>



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Bid Document Preparation	<ul style="list-style-type: none"> <li>i. Prepare scope of work for construction including all signed and sealed tender drawings, technical specifications, special conditions, and technical concepts, and provides to the City for insertion into the bid document</li> <li>ii. Reviews proposed Form of Agreement for conflicts with the design package.</li> <li>iii. Reviews the final version of the bid document</li> </ul>	<ul style="list-style-type: none"> <li>a. Determines sourcing mechanism (ITT, RFP)</li> <li>b. Assembles bid documents</li> <li>c. Reviews and finalizes bid documents</li> </ul>
Bid Document Posting/Advertising	<ul style="list-style-type: none"> <li>i. Provides responses to technical questions received from tenderers</li> <li>ii. Provides input to bid documents amendments</li> <li>iii. Attends and documents site meetings required in the tendering process</li> </ul>	<ul style="list-style-type: none"> <li>a. Posts the bid documents/advertises</li> <li>b. Posts bid document Q&amp;A</li> <li>c. Disseminates technical/Project questions received from proponents to the Consultant</li> <li>d. Posts bid document amendments, Q&amp;A, and/or extensions to closing dates</li> <li>e. Organizes and attends site meetings required in the tendering process</li> </ul>
Proposal Evaluation	<ul style="list-style-type: none"> <li>i. Participates as a member of the tender technical evaluation committee</li> <li>ii. Reviews and scores each submission</li> <li>iii. Assists in evaluating tenders</li> </ul>	<ul style="list-style-type: none"> <li>a. Receives submissions and distributes them to evaluation committee members</li> <li>b. Completes financial evaluation and compiles scores and distributes results to committee members</li> <li>c. Coordinates meetings and compiles scoring for results distribution</li> </ul>
Award Recommendation	<ul style="list-style-type: none"> <li>i. Provide input in recommending tenderers to the City</li> </ul>	<ul style="list-style-type: none"> <li>a. Select tenderers based on the evaluation results</li> <li>b. Prepares the appropriate contract approval document as applicable</li> </ul>
Contract Negotiation & Execution	<ul style="list-style-type: none"> <li>i. Ensure that the scope and specifications in the contract documents are correct prior to execution</li> <li>ii. Issue signed and sealed IFC Drawings to awarded Contractor</li> </ul>	<ul style="list-style-type: none"> <li>a. Primary interfaces with successful tenderer in finalizing contract terms</li> <li>b. Prepares and finalizes contract documents</li> </ul>

**3.8. THE ENGINEER OF RECORD SERVICE**

As the Engineer of Record (the “EoR”), the Consultant is responsible for ensuring all elements of the final design (including any changes made during construction) meet applicable industry design standards criteria and guidelines including those as set out in the City’s Wastewater Pump Station Guidelines.

Engineer of Record services provided by the Consultant during construction may include, but are not limited to, the following:

- a) Act as the coordinating registered professional for the project and ensure that all letters of assurance are completed in accordance with the requirements of the Vancouver Building Bylaw. Letters of assurance shall be completed regardless of whether a Building Permit is required for the project or not. This shall include obtaining letters of assurance for responsibilities designated to the Contractor, such as temporary geotechnical (shoring) works.
- b) Preparing signed and sealed Issued for Construction (IFC) drawings and specifications;
- c) Update and re-issue IFC Drawings as needed;
- d) Review shop drawings;
- e) Review and respond to all communications within a maximum of two (2) days or such shorter period of time appropriate for the type of communications;
- f) Attending regularly scheduled construction meetings at the Project sites;
- g) Carry out site inspections and review the Contractor’s work prior and during construction and prepare inspection reports documenting observed construction activities (to be submitted to the City);
- h) Keep the City informed of the progress and quality of the construction work, and reporting to the City defects and deficiencies in the construction work observed during the course of site reviews;
- i) Rejecting work which does not conform to the construction contract documents;
- j) If design change is required during construction, revise design drawings and prepare/issue Site Instructions as necessary;
- k) Take and maintain digital photographs providing documentation of construction activities (to be submitted to the City);
- l) Maintain awareness of safety and health requirements and enforce regulations/contract provisions for the protection of the public and project personnel in accordance with WorkSafeBC;
- m) Perform construction surveying verification as needed;
- n) Schedule and perform QA and QC to verify compliance with contract documents as per Quality Management Plan;
- o) Review quality testing results and provide list of defects/deficiencies;
- p) Review repair of defects/deficiencies and provide comments on acceptability;
- q) Ensure that all cranes and lifting devices at the facility satisfy relevant regulatory requirements for usage prior to station turn-over. This shall include a signed and



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sealed letter or memo for each crane at the facility in accordance with CSA B167 incorporating relevant record drawings and outlining the crane lifting capacity, crane operating limitations, and stating that the supporting structure and crane as installed is capable of handling the maximum load as rated;

- r) Carry out substantial performance review and issue Certificate of Substantial Performance;
- s) Carry out total performance review and issue Certificate of Total Performance;
- t) Complete signed and sealed record drawings as per the City standards (format shall be in AutoCAD, PDF, and Full size hard copies);
- u) Sign and seal letter of assurance for the constructed works; and
- v) Carry out an end of warranty inspection and prepare a report to advise City and contractor of continuing or newly observed defects or deficiencies.

### 3.9. CONTRACT ADMINISTRATION

The Consultant will act as the City's representative with respect to all construction contracts for the duration of the Project. The Consultant's responsibilities for this task will include but are not limited to:

- a) Liaising (verbal and written) between the City and the Project Contractor(s);
- b) Chairing and providing minutes for regularly scheduled construction meetings, design meetings, and stakeholder meetings.
- c) Reviewing and responding to all communications within a maximum of two (2) days or such shorter period of time appropriate for the type of communication;
- d) Receiving and reviewing written warranties and related documents and forwarding such warranties and documents to the City for acceptance;
- e) Reviewing and making recommendations to the City for change orders and extra work done by the Contractor(s);
- f) Forwarding all instructions from the City to the construction contractor;
- g) Carrying out and coordinating field review from all disciplines;
- h) Determining the amounts owing to the Contractor under the construction contract based on the Consultant's observations and evaluation of the Contractor's applications for payment;
- i) Issuing certificates for payment under the construction contract for work performed;
- j) Interpreting the requirements of the construction documents and communicating the City and, if necessary, the Contractor(s) its opinions as to the performance thereunder by both the City and the Contractor(s);
- k) Rendering written findings, as required within a reasonable time, on all claims, disputes, and other matters in question between the City and the Contractor(s) relating to the execution or performance of the construction work or the interpretation of the construction documents;
- l) Preparing contemplated change orders, change orders, and change directives for the City's approval and signature;

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- m) Determining the date of Substantial Performance of the construction work in accordance with the Builders' Lien Act and the contract documents and issuing certificates of completion for the construction works in respect thereof;
- n) Determining the date of Total Performance of the construction work and issuing a written certificate of same in accordance with the construction contract(s);
- o) Receiving from the construction Contractor(s), reviewing on behalf of the City for construction contract compliance, and, when compliant, forwarding to the City, written warranties and related documents; and
- p) Prior to the end of the period of one year following the date of Substantial Performance, reviewing any defects or deficiencies which have been reported or observed during that period, and notify the Contractor(s) in writing of those items requiring attention by the Contractor(s) to complete the construction work in accordance with the construction contract.

#### **3.10. COMMISSIONING**

The Consultant will:

- a) Ensure Contractor completes functional testing and pre-commissioning checks prior to commissioning.
- b) Prepare project commissioning process, checklists, and documentation in consultation with the City;
- c) Prepare bypass commissioning process, checklists, and documentation in consultation with the City, where applicable;
- d) Oversee the commissioning process for the pump station which shall include demonstration of all set-points, operating modes, alarms, and features for every piece of equipment (including failure scenarios) with a repeat of all tests while operating on the secondary PLC; and
- e) Review and confirm that operation manuals prepared by the Contractor(s) are in accordance with the construction documents, and forward the same (which are compliant) to the City.

It should be noted that the City has a detailed commissioning process for the control systems. This process cannot be started without delivery of the electrical as-built drawings and operation and maintenance manuals.

#### **3.11. PROJECT CLOSE-OUT DOCUMENTATIONS**

The Consultant shall provide the following:

- i. Signed and sealed Record Drawings (the "Drawings") for the works, including any design changes made during the construction, and incorporating contractually related items such as addenda and change orders, and all mark-ups and redline drawings provided by the Contractor(s). These Drawings shall be provided in hard copy and editable AutoCAD electronic format, including drawings from the panel shop, VFD's, soft starters, Genset alarming, SCADA panel, and transfer switch;



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- ii. A commissioning report that shall include, at a minimum, the following:
  - a. Written pump control logic narrative for the operation of the station;
  - b. TDH and flow values for the station (both design values and actual values as determined through commissioning);
  - c. Station set-points (including important notes and rationale for these set-points), calibration parameters, and other key operational data that is not otherwise contained in the O&M manuals; and
  - d. Include verification that all applicable equipment, systems, and components are started up, calibrated, operationally tested, adjusted, balanced, and functionally tested for acceptance by the City
- iii. Copy of PLC Program for the station (provisional);
- iv. Lessons learned review meeting – At the conclusion of the project, the Consultant shall chair a lessons learned meeting that shall include select stakeholders and partners, contractors, and sub-contractors. The results of the lessons learned meeting shall be provided by the Consultant to the City in the Project Wrap-up Report (the “Project Wrap-up Report”);
- v. The Project Wrap-up Report will include at a minimum the following:
  - a. A Signed and sealed letter for the station certifying that the construction has been completed in accordance with the design drawings and specifications
  - b. A detailed written summary of the Project
  - c. A detailed photographic log of the Project
  - d. A final schedule summary and Project timeline showing key Project milestone dates
  - e. A summary explanation of all Project expenditures compared to the budget including all change orders
  - f. Appendices that shall include Project meeting notes, inspection reports, permit copies, etc.
  - g. Summary of lessons learned, including notes from a post Project lessons learned meeting, commentary explaining any major issues and deviations from expectations
- vi. Develop Rapid Damage Assessment Criteria (Provisional)

The City would like to develop Rapid Damage Assessment (RDA) forms for each of its pump stations. The RDA forms are intended to assist City staff with high-level visual assessments of the facility following a major earthquake to identify if the facility is safe for workers to enter (with or without restrictions), and identify components critical to station operation that have sustained major damage. The Consultant will develop an RDA form for this station which shall include but not be limited to:





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- a. Critical items that could pose a safety hazard to responding personnel, and should be assessed prior to worker entry (i.e. utility issues, extreme settlement, sagging of structural elements, extensive cracking, etc.). The Consultant shall recommend safe viewpoint and access locations to conduct these assessments.
- b. Items critical to station operation that should be assessed for damage upon worker entry.
- c. Document the existing condition of items identified above with a written description (including any defects) and pictures. This will act as the baseline for comparison.
- d. Provide a general inspection methodology and sequence for various station components, highlight areas requiring special attention, and establish visual references for damage thresholds that warrant action (i.e. locking out equipment, barring entry to the building). This methodology shall provide descriptive and pictorial representation of different levels of damage (i.e., minor vs. severe cracking)
- e. Recommend a threshold on the Modified Mercalli Scale at which an RDA must initiate
- f. Develop an RDA template for pump stations and populate it with data specific for Nelson Pump Station. The City will provide RDA forms developed for City-owned bridges as an example.



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#### 3.12. PROJECT SEQUENCING

The Project shall include the phasing shown in the table below. The Key Deliverables are listed in the phase under which it will primarily occur, although some Key Deliverables shall transcend multiple phases.

Project coordination provided by the Consultant shall transcend all phases and includes, but is not limited to, preparation of agendas, meeting minutes, chairing project meetings, all phone calls, emails, queries, meetings, etc. that may be required to complete the work, including to consult and/or seek clarification on scope items.

Project Phase	Project Requirements (Described Above)	Key Deliverables
Pre-Design Report (Phase 1)	<ul style="list-style-type: none"> <li>i. Transient Review</li> <li>ii. Archaeological, Environmental, and Geotechnical assessments</li> <li>iii. Conceptual Design</li> <li>iv. Written description of project requirements</li> <li>v. PMF Documentation</li> </ul>	<ul style="list-style-type: none"> <li>a. Risk Register</li> <li>b. Stakeholder Register</li> <li>c. Hydraulic Transient Assessment</li> <li>d. Phase II Environmental Site Assessment</li> <li>e. Geotechnical Report (Provisional)</li> <li>f. Discharge Header Evaluation</li> <li>g. Flood Risk Assessment</li> <li>h. Conceptual Design Report</li> <li>i. Conceptual (25%) Design Drawings and Class C Cost Opinion (for 3 Options)</li> </ul>
Design and Tendering (Phase 2)	<ul style="list-style-type: none"> <li>i. Design and Specifications</li> <li>ii. Construction Tendering Support</li> </ul>	<ul style="list-style-type: none"> <li>a. 50%, 75%, 90%, 95%, 100%, IFT, and IFC Design Drawings</li> <li>b. 50%, 75%, 90%, 100%, IFT, and IFC Design Specifications - including results of geotechnical, environmental, structural, and/or archaeological investigations and design information</li> <li>c. Design Report (updated at each submittal stage)</li> <li>d. Construction Cost Estimates (Class A, B, C, or D as appropriate for each design submittal)</li> <li>e. Process Control Narrative</li> <li>f. Bypass Options and Construction Sequencing Memo</li> <li>g. Construction Schedule</li> <li>h. Construction methodology and bypass pumping requirements memorandum</li> <li>i. Prepare Tender and Contract Documents and evaluate and recommend tender award</li> </ul>



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		<ul style="list-style-type: none"> <li>j. Design Management Tracker</li> <li>k. Quality Management Plan by Contractor</li> </ul>
Construction Management (Phase 3)	<ul style="list-style-type: none"> <li>i. Engineer of Record Services</li> <li>ii. Contract Administration</li> <li>iii. PLC Programming (provisional)</li> <li>iv. Commissioning</li> <li>v. Project Close-out Documentation</li> </ul>	<ul style="list-style-type: none"> <li>a. Field and engineering inspections as per Quality Management Plan and/or City's requirements with inspection reports</li> <li>b. Shop Drawings</li> <li>c. Arc Flash Assessment</li> <li>d. Site Instructions with revised IFC drawings as needed</li> <li>e. Start-up and Commissioning</li> <li>f. Certificates of Substantial and Total Performance</li> <li>g. Signed and sealed record drawings in City requested formats and letters of assurance</li> <li>h. Rapid Damage Assessment forms</li> <li>i. End of warranty inspection report</li> <li>j. Project Wrap-Up Report</li> <li>k. Lessons Learned Log</li> <li>l. Review of defects or deficiencies prior to the end of the period of one year following the date of Substantial Performance.</li> </ul>

#### 4. PRICING REQUIREMENTS FOR THE RFP

The City requests the following to be priced out by the Consultant for Phases 1 through 3 of the Project.

- a) An itemized cost breakdown indicating activities from Section 3 (Work Scope), in addition to a total fixed fee (lump sum) for all activities listed in Section 3.
- b) Design, contract administration, and construction field reviews for the Thornton Park Pump Station Upgrades in accordance with requirements of this Scope of Work.
- c) All costs (except for the permitting fees which will be paid directly by the City) to carry out any required geotechnical, structural, and archaeological investigations, or to hire Sub-Consultants, in their proposals price.
- d) Hourly rates for each personnel listed. Change orders shall be base don the hourly rates provided in the proposal.



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## 5. SCHEDULE

The suggested schedule of milestones is as follows. The proponent's proposals should demonstrate that the project can meet these key milestone dates.

If the timeline below is not achievable, the proponent must clearly state this in their submission and provide an alternate schedule for consideration.

This project is primarily driven by the new St. Paul's Hospital (scheduled for occupancy in 2027) and the pump station upgrades must be commissioned before the occupancy of the new hospital. The Consultant shall be responsible for coordinating with Providence Health Care and the Contractor to monitor the construction and schedule status of the St Paul's Hospital project.

Event	Target Completion Date
Award Consultant Contract	November 2021
Conceptual Design	April 2022
Detailed Designs and Specifications	June 2023
Issue IFT	July 2023
Construction Tendering, ITT	January 2024
Construction and Contract Administration	February 2025
Substantial Completion of Work	January 2025
Total Completion	February 2025
Project Wrap Up Documentation	May 2025



## Scope of Work

### Professional Services for Thornton Park Pump Station Upgrades Project

**Created by:** Thomas Mah,  
Terry Zhang

**Rev date:** August 26 2021

#### 6. CITY PROVIDED WITH RFP

- a) City of Vancouver Engineering Design Manual
- b) City of Vancouver Standard Detail Drawings
- c) City of Vancouver Engineering Construction Specifications
- d) Wastewater Pump Station Guidelines
- e) Selection of station record drawings as available
- f) Owner's List of Hazardous Materials
- g) Confined Space Identification and Hazard Assessment
- h) Thornton Park Pump Station Hazardous Building Material Survey (June 2021) – North West Environmental Group Ltd
- i) Thornton Park Pump Station Assessment Upgrade Report (Jan 2020) – AECOM
- j) Thornton Park Pump Station Wetwell Condition Assessment (May 2021) – Water Street Engineering

#### 7. CITY PROVIDED UPON AWARD

- a) Detailed Record drawings as available for the pump station and surrounding sewer civil works (gravity sewer piping, forcemain, etc.);
- b) Access to the pump station as required by the Consultant; and
- c) Station SCADA data (pump amperage, wetwell levels, etc.).

#### 8. CONSULTANT EXPERIENCE REQUIREMENTS

In order to ensure the Project and quality management goals for this Project are accomplished, it is expected that a number of key personnel within the Proponents Project team will be required to be dedicated throughout the full duration of the Project (on a part-time basis). It is expected that the following roles will be clearly identified in the Proponent's RFP response:

- a) Project Manager (dedicated to the Project through all phases of the work);
- b) Lead Designer(s) & EoR (dedicated to the Project through all phases of the work);
- c) Site Inspector (dedicated to the Project during Phase 3 of the work);
- d) Field Engineer (available to the Project during Phase 3 of the work)
- e) PLC Programmer (Provisional - dedicated to the Project during Phase 3 of the work)
- f) Structural Engineer (Provisional - if option C (building replacement) is selected during Phase 3 of the work)



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#### 9. KEY CONSIDERATIONS IN THE PROPOSAL SHALL INCLUDE:

- a) An overview of the proponent's company profile, history, corporate sustainability initiatives, and an outline of relevant pump station refurbishment projects of similar scope and magnitude.
- b) An in-depth overview of the proponent's proposed Project Manager, Lead Designer, Sub-Consultants, and other key team members outlining their qualifications and relevant experience on pump station refurbishment projects.
- c) Demonstration of overall understanding of project scope, objectives, vision, and timing. The Proponent should identify special challenges to successful completion of the project and how they will overcome the challenges.
- d) A detailed work plan outlining the Proponent's strategies, assumptions, schedule, level of effort, and philosophies for completing this project. The work plan should be comprehensive and include any innovative solutions or alternative approaches proposed for this project.